

## CLAIMS:

1. An electrophoretic display device (1) comprising an electrophoretic material comprising charged particles (8, 9) in a fluid (10), a plurality of picture elements, a first and second electrode (5, 6) associated with each picture element, the charged particles (8, 9) being able to occupy a position being one of a plurality of positions between said electrodes (5, 6), said positions corresponding to respective optical states of said display device (1), and drive means arranged to supply a drive waveform to said electrodes (5, 6), said drive waveform comprising a sequence of drive signals to be applied during respective image update periods, each drive signal effecting an image transition by causing said particles (8, 9) to occupy a predetermined optical state corresponding to image information to be displayed, wherein a drive signal is applied, during each image update period, to every pixel in respect of which substantially no optical state change is required from the optical state effected during an immediately previous image update period, which drive signal is of a polarity and duration to cause said charged particles to move back toward said optical state effected during said immediately previous image update period.
2. A display device (1) according to claim 1, wherein the drive waveform includes a reset pulse, prior to a drive signal.
3. A display device according to claim 2, wherein the reset pulse, prior to a drive signal, comprises an additional reset duration.
4. A display device (1) according to any one of claims 1 to 3, wherein one or more shaking pulses are provided in the drive waveform.
5. A display device (1) according to claim 4, wherein one or more shaking pulses may be provided prior to a drive signal.
6. A display device according to claim 4 or claim 5, wherein an even number of shaking pulses are provided in the drive waveform.

7. A display device according to claim 4 or claim 5, wherein the shaking pulse has an opposite polarity to the subsequent data pulse when a single shaking pulse is applied.
- 5 8. A display device (1) according to any one of the preceding claims, comprising two substrates, at least one of which is substantially transparent, whereby the charged particles (8, 9) are present between the two substrates.
- 10 9. A display device (1) according to any one of the preceding claims, wherein the charged particles (8, 9) and the fluid (10) are encapsulated.
10. A display device (1) according to claim 9, wherein the charged particles (8, 9) and the fluid (10) are encapsulated in the form of individual microcapsules each defining a respective picture element.
- 15 11. A display device (1) according to any one of the preceding claims, having at least three optical states.
- 20 12. A display device (1) according to any one of claims 1 to 11, wherein the drive waveform is pulse width modulated.
13. A display device (1) according to any one of claims 1 to 11, wherein the drive waveform is voltage modulated.
- 25 14. A display device (1) according to any one of the preceding claims, wherein at least one individual drive waveform is substantially dc-balanced.
- 30 15. A display device (1) according to any one of the preceding claims, wherein at least some of the sub-sets of closed loops wherein an image transition cycle causes a pixel to have substantially the same optical state at the end of said cycle as at the beginning, are substantially dc-balanced.
16. A method of driving an electrophoretic display device (1) comprising an electrophoretic material comprising charged particles (8, 9) in a fluid (10), a plurality of

picture elements, a first and second electrode (5, 6) associated with each picture element, the charged particles (8, 9) being able to occupy a position being one of a plurality of positions between said electrodes (5, 6), said positions corresponding to respective optical states of said display device (1), the method comprising supplying a drive waveform to said electrodes  
5 (5, 6), said drive waveform comprising a sequence of drive signals to be applied during respective image update periods, each drive signal effecting an image transition by causing said particles (8, 9) to occupy a predetermined optical state corresponding to image information to be displayed, wherein a drive signal is applied, during each image update period, to every pixel in respect of which substantially no optical state change is required  
10 from the optical state effected during an immediately previous image update period, which drive signal is of a polarity and duration to cause said charged particles to move back toward said optical state effected during said immediately previous image update period.

17. Apparatus for driving an electrophoretic display device (1) comprising an  
15 electrophoretic material comprising charged particles (8, 9) in a fluid (10), a plurality of picture elements, a first and second electrode (5, 6) associated with each picture element, the charged particles (8, 9) being able to occupy a position being one of a plurality of positions between said electrodes (5, 6), said positions corresponding to respective optical states of said display device (1), the apparatus comprising drive means arranged to supply a drive  
20 waveform to said electrodes, said drive waveform comprising a sequence of drive signals to be applied during respective image update periods, each drive signal effecting an image transition by causing said particles (8, 9) to occupy a predetermined optical state corresponding to image information to be displayed, wherein a drive signal is applied, during each image update period, to every pixel in respect of which substantially no optical state  
25 change is required from the optical state effected during an immediately previous image update period, which drive signal is of a polarity and duration to cause said charged particles to move back toward said optical state effected during said immediately previous image update period.

30 18. A drive waveform for driving an electrophoretic display device (1) comprising an electrophoretic material comprising charged particles (8, 9) in a fluid (10), a plurality of picture elements, a first and second electrode (5, 6) associated with each picture element, the charged particles (8, 9) being able to occupy a position being one of a plurality of positions between said electrodes (5, 6), said positions corresponding to respective optical states of

said display device (1), the apparatus comprising drive means arranged to supply said drive waveform to said electrodes (5, 6), said drive waveform comprising a sequence of drive signals to be applied during respective image update periods, each drive signal effecting an image transition by causing said particles (8, 9) to occupy a predetermined optical state  
5 corresponding to image information to be displayed, wherein a drive signal is applied, during each image update period, to every pixel in respect of which substantially no optical state change is required from the optical state effected during an immediately previous image update period, which drive signal is of a polarity and duration to cause said charged particles to move back toward said optical state effected during said immediately previous image  
10 update period.